

TRACHEAL TUBE DEVICES

BACKGROUND OF THE INVENTION

This invention relates to tracheal tube devices of the kind for insertion into the trachea, the device comprising a main tube encompassed towards its distal end by an inflatable bag and, extending to the interior of the bag, an inflation line by which the bag can be inflated. Generally, the inflatable bag is a cuff or a balloon.

A common feature of tracheal tube devices of this kind, such as endotracheal or tracheostomy tubes, is that bodily secretions, mucous, or other unwanted fluids can collect in the cusp between the inner surface of the body conduit and the ovate upstream surface of the inflated cuff or balloon. These bodily secretions often pass progressively between the inner surface of the trachea and the outer surface of the cuff or balloon—even though these surfaces are supposed to be in mutually sealing contact. These bodily secretions can pass from the trachea and enter the bronchi, potentially to cause lung infections. This passage of unwanted fluids past the inflated bag of the tracheal tube device is thought to be due to the patient's breathing cycle producing fluctuating inhalation/exhalation pressures on the downstream ovate surface of the inflated bag and causing the latter and/or the tracheal conduit to act somewhat in the manner of a peristaltic pump.

One proposed solution to this problem is to provide the tube device, not only with an inflation line to the distal bag but also with a suction line opening to a region above the bag. In practice however, due to the finite axial length accommodated by the tape or other fastening means required to attach the bag sealingly to the main tube of the structure, the opening from the suction line is disposed too far above the upstream ovate surface of the bag to ensure removal by suction of all the unwanted fluids collecting in that region. Even where the collar of the bag is everted, in the manner described in GB-2250440, suction may not ensure complete removal of all secretions.

It is thus clearly desirable to provide an improved tracheal tube device.

SUMMARY OF THE INVENTION

According to the present invention there is provided a tracheal tube device for insertion into the trachea, the device comprising:

- a main tube encompassed towards its distal end by a first inflatable bag;
- an inflation line extending to the interior of the first bag by which the first bag can be inflated; and
- a second bag to encompass the main tube; characterized in that
 - the device includes a second inflation line by which the second bag can be inflated separately from the first bag, and in that
 - the second inflatable bag is dimensioned and arranged in use to occupy the space from the first inflatable bag—i.e. between contact with or close proximity to the first inflatable bag—to at least the patient's vocal chords.

Preferably, the second bag extends through the vocal chords. The second bag may be about three times the length of the first bag. The second bag is preferably inflated in use to a lower pressure than the first bag, such as between about 2 and 5 cm water. The device may include a suction line extending from the proximal end of the device and opening

on the main tube at a location between the first and second bags. The first bag may have an upper surface shaped to form a receptacle for the collection of fluids. The second bag may be a cuff attached at its ends with the main tube or it may be a balloon that encompasses the wall of the main tube, in which case, the second bag may be slidable along the main tube. Advantageously, the lower end of the second bag, when inflated, nests within the receptacle provided by the upper surface of the first bag, when inflated.

According to another aspect of this invention there is provided a method of intubation into the trachea of an animal or human patient a tracheal tube device having the foregoing construction, comprising the steps of:

inserting the main tube and first inflatable bag through the larynx into the trachea to dispose the first bag in spaced relation to the larynx,

inflating the first bag via the first inflation line,

providing the second inflatable bag between the first bag and the larynx such that, when inflated, the second bag may contact or closely approach the first bag, and

inflating the second bag to be in contact with or closely approach the first bag and occupy the space between the first bag and the larynx, preferably to extend through the larynx.

Advantageously, the first bag is inflated to a first pressure, and the second bag is inflated to a second pressure lower than the first pressure.

BRIEF DESCRIPTION OF THE DRAWINGS

By way of example, embodiments of this invention will now be described with reference to the accompanying drawings of which:

FIG. 1 is a schematic longitudinal section of an endotracheal tube according to one embodiment of this invention;

FIG. 2 is a partly cut-away generalized view of the embodiment of FIG. 1; and

FIG. 3 is a partly cut-away generalized view of an endotracheal tube according to a second embodiment of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The illustrated endotracheal tube device **10** of FIGS. 1 and 2 is a tubular structure for insertion into a human or animal trachea **11** via the mouth or nose. The device **10** incorporates a substantially conventional endotracheal tube which comprises a main tube **12** with an axial bore, the tube having a proximal or machine end **14** and a distal or patient end **16** with an inflatable bag **20** encompassing the main tube adjacent the distal end **16**. The device also has a second bag **50** to be described in detail below.

An inflation line **18** leads to the interior of the bag **20** to enable it to be inflated with air to a generally ovate-shape. The inflation line **18** is attached or integrally moulded with the wall of main tube **12** for the majority of its length such as to be internally (or externally) bonded to, or extruded integrally with, the wall of main tube **12**. The proximal end of the inflation line **18** is provided with a spring-loaded valve **19** (FIG. 2) that is normally closed but is opened by insertion of a syringe (not shown) that is used to inflate the bag **20**.

A suction line **26** is attached or integrally moulded with the wall of main tube **12** for the majority of its length such as to be externally (or internally) bonded to, or extruded integrally with, the wall of main tube **12**. This suction line **26** extends a position to adjacent the top surface of bag **20**